Midterm Exam

CMSY-199, Fall 2010

Section 1. Fill in the blanks in each of the following statements:

1. There are two aspects to learning Java - the _____ itself and the classes in the _____.
2. The defining characteristic of an object is that it has _____ and exhibits _____.
3. In order to read keyboard input from the user in a Java program, you should import the _____ class from the _____ package.
4. An error which violates the rules of the Java language and prevents compilation is called a _____ error while an error that produces an incorrect result during runtime is a _____ error.
5. The root of the Java class hierarchy is the _____ class which is in the _____ package.
6. In order to create an instance of a class, you must use the _____ keyword and make a call to the _____.
7. Java has two fundamental data types - the _____ type and the _____ type.
8. The members of a class consist of its _____ and _____.
9. Two of the 14 types of UML diagrams have been presented in class - the _____ diagram and the _____ diagram.
10. When writing a GUI application, you often need to import classes from the java._____ and the javax._____ packages.

Section 2. Answer True or False to each of the following statements:

_____ 11. If the number of loop iterations is known in advance, it is best to use sentinel-controlled repetition.

_____ 12. The Java selection statements include `if`, `if..else`, and `switch`.

_____ 13. The `break` and `continue` statements can be used to alter the flow of execution inside a repetition statement.

_____ 14. The conditional OR operator (`||`) has higher precedence than the conditional AND operator (`&&`).

_____ 15. A `static` method may only be called on a specific instance of a class.

_____ 16. Methods which have the same signature but different return types are said to be overloaded.

_____ 17. The number of elements in an array is stored in the `size` instance variable while the number of elements in an `ArrayList` can be retrieved with a call to the `length()` method.

_____ 18. When an array is created, all of its elements are initialized to a default value.

_____ 19. The `Arrays` class can automatically change size at runtime to accomodate additional elements.

_____ 20. The `ArrayList` class is a member of the Java Collections Framework.

Section 3. Circle the letter of the best answer for each question:

21. What symbol is used to indicate a variable-length argument list?
    (a) ellipsis
    (b) guillemets
    (c) backslash
    (d) caret

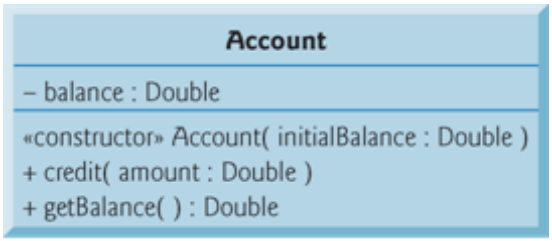
22. Which of the following is *not* a valid Java identifer?
    (a) `SEVEN_WONDERS`
    (b) `_sevenWonders`
    (c) `7wonders`
    (d) `SevenWonders$`

23. Which of the following obeys the standard Java naming conventions for a class name?
    (a) `SomeClass`
    (b) `SOME_CLASS`
    (c) `someClass`
    (d) `someclass`

24. The command-line arguments for a Java application are stored in an array called `args`. What is stored in the element `args[0]`?
    (a) The number of command-line arguments
    (b) The name of the Java application
    (c) The first command-line argument
    (d) The version number of the JVM

25. The size (in bits) of the primitive `char` type in Java is
    (a) 8
    (b) 16
    (c) 32
    (d) 64
26. What character encoding set does Java use to represent characters?
    (a) ASCII
    (b) EBCDIC
    (c) Unicode
    (d) UTF-8
27. Which of the following is a Java keyword that is currently not used?
    (a) `const`
    (b) `final`
    (c) `immutable`
    (d) `parameter`
28. Which of the following is a primtive floaing point type in Java?
    (a) `real`
    (b) `complex`
    (c) `decimal`
    (d) `double`
29. What is true about Java regular expressions?
    (a) The `\w` metacharacter searches for whitespace.
    (b) The `\d` metacharacter searches for numeric digits.
    (c) The `.` metacharacter searches for alphabetic characters.
    (d) The String `[af]` searches for `a`, `b`, `c`, `d`, `e`, or `f`, characters.
30. Which of the following is *not* an exception thrown by the JVM?
    (a) `ClassNotFoundException`
    (b) `NullPointerException`
    (c) `SemiColonMissingException`
    (d) `ArrayIndexOutOfBoundsException`

31. What Java access modifier should be used for the field `balance` in the UML diagram shown below?



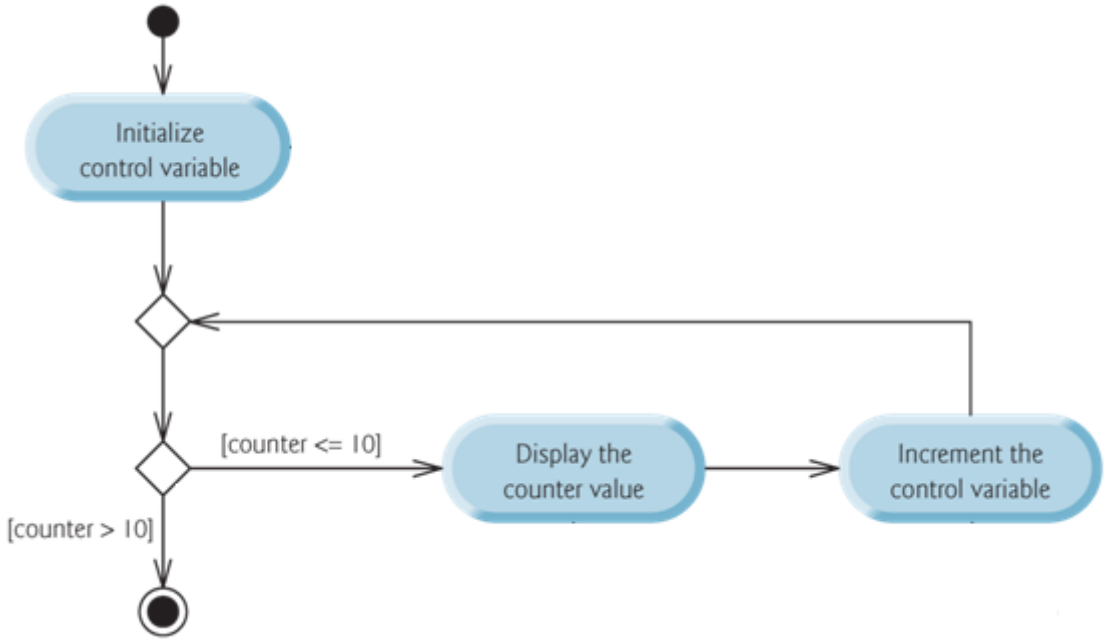
(a) `public`

(b) `private`

(c) `protected`

(d) no modifier is needed - default or package access

32. Which Java control statement corresponds to the UML diagram shown below?



(a) `if...else`

(b) `switch`

(c) `for`

(d) `do...while`

Section 4. Answer the following questions:

33. The `separateDigits` method takes a five digit number and separates it into its individual digits. Provide the missing arithmetic expressions needed to separate the second, third, and fourth digits.

```
public void separateDigits(int number)
{
   int digit1 = number / 10000;
   int digit2 =
   int digit3 =
   int digit4 =
   int digit5 = number % 10000 % 1000 % 100 % 10;
   System.out.printf("%d %d %d %d %d",digit1, digit2, digit3, digit4, digit5);
}
```

34. Given the following three-argument constructor, write a Java statement to create an instance of the `Employee` class called `oracleChief` for an employee whose name is Larry Ellison and has an annual salary of 84.5 million dollars.

```
public Employee(String first, String last, double pay)
{
   firstName = first;
   lastName = last;
   salary = pay;
}
```

35. The `determineLargest` method takes a ten-element integer array and returns the largest integer in that array. Write the Java code to implement this method.

```
public int determineLargest(int number[])
{




}
```

36. Using the static `min` method from the `Math` class, write a single Java statement which assigns the smallest of three integer variables - `a`, `b`, and `c` - to an integer variable named `minimum`.

37. What output is produced by the following Java code segment?

```
for (int i=1; i <= 4; i++)
{
   for (int j=1; j <= i; j++)
      System.out.print("*");
   System.out.println();
}
```

38. What is the output when the following Java application is run?

```
public class Zeta
{
   public static void main(String args[])
   {
      int x = 1;
      if((4 > x) ^ ((++x+2) > 3)) x++;
      if((4 > ++x) ^ !(++x == 5)) x++;
      System.out.println(x);
   }
}
```

39. The `playKeno` method returns a twenty-element array of *unique* random integers from 1 to 80, inclusive. Provide the missing Java code to complete this method.

```
public int[] playKeno()
{
   Random randomNumbers = new Random();
   int[] numbers = new int[20];
   int count = 0;
   while (count < numbers.length)
   {
      boolean containsNumber = false;



      if (!containsNumber)
      {


      }
   }
   return numbers;
}
```

40. Complete the `TrafficLight` class by writing a `switch` statement that prints the appropriate action to take based on the color of the traffic light.

```
public class TrafficLight
{
   private enum Color {RED, YELLOW, GREEN};

   public void printAction(Color lightColor)
   {
      switch(          )
      {









      }

   }
}
```

Section 5. Circle the letter of the best answer for each question:

41. What is the output when the following Java application is run?

```
public class Dog
{
   private String name;

   public static void main(String args[])
   {
      Dog myDog = new Dog();
      myDog.name = "Achilles";
      int age = 4;

      changeDog(myDog, age);
      System.out.println(myDog.name + "  " + age);
   }

   private static void changeDog(Dog dog, int age)
   {
      dog.name = "Chloe";
      age = 3;
   }
}
```

(a) `Achilles 3`

(b) `Achilles 4`

(c) `Chloe 3`

(d) `Chloe 4`

42. Consider the following code segment.

```
int k = 2;
while (true)
{
   ++k;
   int j = 6;
   k = 9 - j;
   if (j++ == 3)
      continue;
   else
      break;
}
System.out.println(k);
```

What is printed as a result of executing the code segment?

(a) 2

(b) 3

(c) 6

(d) 7

43. What is the output if you compile and run the following Java application?

```
public class Welcome
{
   public static void main()
   {
      System.out.print("Welcome to ");
      System.out.println("Java Programming!");
   }
}
```

(a) `Welcome to Java Programming!`

(b) `Welcome to`
`Java Programming!`

(c) Compilation fails.

(d) An exception is thrown at runtime.

44. What is the output if you compile and run the following Java application?

```
public class Sandwich
{
   public static void main(String args[])
   {
      boolean ham = false;
      boolean cheese = true;
      if ((ham = true)  && (cheese = true))
         System.out.println("Lunchtime!");
      else
         System.out.println("Where's mine?");
   }
}
```

(a) `Lunchtime!`

(b) `Where's mine?`

(c) Compilation fails.

(d) An exception is thrown at runtime.

45. What is the output if you compile and run the following Java application with the command `java Vark we rule`?

```
public class Vark
{
   public static void main(String args[])
   {
      Vark v = new Vark();
      v.go(args,42);
   }

   private void go(String a[], int life)
   {
      System.out.println(a[1]);

   }
}
```

(a) `we`

(b) `rule`

(c) Compilation fails.

(d) An exception is thrown at runtime.

46. What is the output if you compile and run the following Java application?

```
public class ForLoop
{
   public static void main(String args[])
   {
      int x = 2;
      int y;
      for (y=2; y > 0; y--)
      {
         System.out.print(x + " " + y + " ");
         x++;
      }
      System.out.print(x + " " + y + " ");
   }
}
```

(a) `2 1 3 0`

(b) `2 2 3 1 4 0`

(c) Compilation fails.

(d) An exception is thrown at runtime.

47. What is the output if you compile the following Java classes and run the `Defender` application?

```
public class Defender
{
   public static void main(String args[])
   {
      Alien a = new Alien();
      System.out.println(a.invade(7));
   }
}

public class Alien
{
   public String invade(int... ships)
   {
      if (ships.length <= 1) return "a few";
      else return "many";
   }

}
```

(a) `a few`

(b) `many`

(c) Compilation fails.

(d) An exception is thrown at runtime.

48. What is the output if you compile and execute the following Java application?

```
public class BeeKeeper
{
   public static void main(String args[])
   {
      String d = "beekeeper";
      d.substring(1,7);
      d = "w" + d;
      d.insert(3,"bee");
      System.out.println(d);
   }
}
```

(a) `weebeekeep`

(b) `wbeekeeper`

(c) Compilation fails.

(d) An exception is thrown at runtime.

49. Consider the following code segment.

```
for (int k = 0; k < 20; k = k + 2)
{
   if (k % 3 == 1)
   System.out.print(k + " ");
}
```

What is printed as a result of executing the code segment?

(a) `4 16`

(b) `4 10 16`

(c) `0 6 12 18`

(d) `1 4 7 10 13 16 19`

(e) `0 2 4 6 8 10 12 14 16 18`

50. Consider the following code segment.

```
ArrayList<String> list = new ArrayList<String>();

list.add("P");
list.add("Q");
list.add("R");
list.set(2, "s");
list.add(2, "T");
list.add("u");
System.out.println(list);
```

What is printed as a result of executing the code segment?

(a) `[P, Q, R, s, T]`

(b) `[P, Q, s, T, u]`

(c) `[P, Q, T, s, u]`

(d) `[P, T, Q, s, u]`

(e) `[P, T, s, R, u]`